SIM UNIVERSITY

FIN201
Financial Mathematics

Assignment 2 - Individual Assignment/TMA02

July 2016 Presentation

Individual Assignment

This assignment is worth 25% of the final mark for FIN201 Financial Mathematics.

The cut-off date for this assignment is **31 October 2016, 2359hrs.**

In this assignment, you are expected to:

- Use a computing tool (e.g. Excel/Google Spreadsheets or Python) for financial calculations.
- Use a financial information system (e.g. Reuters Eikon, or the Internet) for obtaining market data and information as well as harnessing well-documented API/library/models to make inferencing more expedient.

Question 1

The term structure is a basic device that provides a snapshot of the interest rate environment in terms of borrowing costs across terms.

(a) Describe how the term structure is constructed starting from a set of yields of par bonds across terms.

(10 marks)

(b) Do the following exercises from Chapter 8 of the textbook: 80, 81. Be sure to express your answers clearly in your own words, based on your own understanding, with Python as an aid in your calculations and reasoning.

(10 marks)

Question 2

The interest rate parity is a fundamental notion that is applied to relate exchange rates with interest rates.

(a) Describe the relationship between exchange rates and interest rates in the interest rate parity.

(10 marks)

(b) Do the following exercises from Chapter 9 of the textbook: 83, 84. Be sure to express your answers clearly in your own words, based on your own understanding, with Excel as an aid in your calculations and reasoning.

(10 marks)

Question 3

The equity option market is closely linked to the stock market but at the same time it is structurally different from the latter.

(a) Describe ***three (3)*** significant features of the option market that distinguish it from the stock market and ***two (2)*** ways that the two markets are closely linked.

(10 marks)

(b) Do the following exercises from Chapter 9 of the textbook: 97, 99. Be sure to express your answers clearly in your own words, based on your own understanding, with Python as an aid in your calculations and reasoning.

(10 marks)

Question 4

Augustin manages bonds in the fixed income arm of a private equity company. He holds a portfolio of the following bonds:

Bond	Coupon rate	Maturity	Number of bonds
a	4.5%	0.5 year	500
b	5.5%	1 year	750
c	6.5%	1.5 years	1000
d	5%	2 years	600

Augustine collects the following data on government bonds:

Maturity	Coupon rate	Yield
0.5 year	0%	3%
1 year	0%	3%
1.5 years	3%	
2 years	5%	

Assume that every bond in question has a face value of SGD 1000 and pays coupons semi-annually, and the 1.5y and 2y government bonds are issued at par.

(a) Compute all the discount factors from the information given.

(10 marks)

(b) Calculate the current value of Richard's bond portfolio.

(10 marks)

Show your workings clearly with calculations performed with Excel.

Question 5

Answer the following questions on option pricing.

(a) Suppose that a call option and a put option have the same characteristics (i.e. same underlying, strike price and time-to-maturity) and are European. Describe, using a graph, the payoff of the position in which the call option is long and the put option is short.

(6 marks)

(b) Suppose that the stock price of a company X is currently USD 200, has a volatility of 30% and the prevailing risk-free rate is 2%. Find, by applying the Black-Scholes formula, the price of an at-the-money put option that matures in 3 months. Who in the financial market would quote an option price this way?

(7 marks)

(c) Suppose that the stock price of a company Y is currently USD 250, has a volatility of 25% and the prevailing risk-free rate is 2.5%. What is the hedging position in the stock for an option writer who has sold an at-the-money 6-month call option 3 months ago?

(7 marks)

Show your workings clearly with calculations performed with Python.

---- END OF ASSIGNMENT ----